FAA Telecommunications Infrastructure 2 (FTI-2) Program

Challenges and Focus Areas

Informational Paper

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Introduction:

The FAA currently obtains a majority of the telecommunications services it requires through the FAA Telecommunications Infrastructure (FTI) contract that expires at the end of September 2017. While the FAA has announced its intent to award a single source "bridge" contract to the current FTI service provider (Harris Corporation) to extend FTI services through 2022 (if all options are exercised), the FAA has also initiated planning for a follow-on program, referred to as "FTI-2," that could result in one or more competitive awards as early as 2020.

Current Operating Environment:

The FAA obtains approximately 25,000 telecommunications services under the existing FTI contract to support a broad spectrum of the agency's requirements ranging from critical air traffic control operations to routine administrative functions. These include voice services, synchronous and asynchronous data services, Internet Protocol (IP) network services, and "enterprise messaging services." FTI services are provided over a dedicated optical backbone infrastructure and interexchange carrier (IXC) private line services as well as dedicated microwave and satellite resources.

The FTI network supports seven different availability levels with the highest being 0.9999971. FTI relies heavily upon commercial telecommunications infrastructure, but, to meet the required availability levels, the FTI contractor provides dedicated nodal infrastructure at the 4,000+ service delivery locations. The nodal infrastructure is the property of the FTI prime contractor and its service provider teammates. They are responsible for performing technology refreshes as required to ensure the continued supportability of the network.

The majority of FTI telecommunications services originate or terminate in the continental United States (CONUS), but the FTI contractor is also required to provide services to FAA and stakeholder locations outside the CONUS (e.g., Hawaii, Alaska, Puerto Rico, Guam, and international locations). FAA stakeholders include the Department of Defense (DoD), the National Weather Service (NWS), and foreign air traffic control entities such as NAVCANADA. Within the CONUS, FTI relies upon an optical backbone that consists of 2.5 Gbps and 10 Gbps optical waves that connect major FTI network points of presence (POPs). FAA high-traffic volume facilities connect to the optical backbone via SONET rings or direct OC-level fiber connections. Recently, the FTI contractor has implemented a second, completely independent routing domain for Operational IP services as an added level of protection against faults that could propagate across a single routing domain.

In addition to traditional "Layer 3" transport services, the FAA obtains a wide range of value-added services through the FTI contract including:

- Service-Oriented Architecture (SOA)-based enterprise (Layer 7) messaging services;
- Boundary protection and enterprise security gateway services;
- Domain Name Services (DNS); and
- Network Time Protocol and Precision Time Protocol (NTP/PTP) services.

As part of providing this broad portfolio of telecommunications, enterprise messaging, and infrastructure services, the FTI contractor is also responsible for:

- Network Engineering;
- Service/Infrastructure Qualification and Operation of FTI National Test Bed;
- Configuration Management;
- Service Provisioning and Cutover Support;
- Network Monitoring and Control; and
- Security Management.

In providing this comprehensive set of support services, the FTI contractor is responsible for the end-to-end performance of FTI services and commits to meeting FAA-specific performance requirements through a detailed service level agreement (SLA). The FTI contractor also must provide the FAA with the assurance that FTI services are configured to meet the FAA's diversity and avoidance requirements. This is an ongoing process given the potential for re-grooming in the carrier networks.

Challenges:

The FAA faces a range of challenges in the planning for the FTI-2 program. First is the magnitude of the service inventory and the number of sites affected. Transitioning 25,000+ services can take an extended period of time during which the FAA will incur parallel operating costs with the legacy FTI network and the new FTI-2 network. The optimal transition strategy will likely depend on the proposed network architecture of the FTI-2 service provider which will not be known until contract award.

The transition is complicated by the fact that commercial service offerings do not meet the FAA's unique performance and security requirements. To meet those requirements, the FAA's service provider typically must deploy customer premise equipment (CPE) that provides automatic protection switching and is specifically configured to meet the FAA's service requirements. When transitioning from FTI to FTI-2, the FAA will have to plan for the space and power requirements to support the deployment of new CPE and the parallel operation of two separate infrastructures until the legacy FTI CPE can be removed.

Due to the criticality of National Airspace System (NAS) operations, the FAA requires protection from "6-sigma" events that could result in extended duration or wide scale outages. To provide this additional level of survivability, the FTI service provider has implemented a highly redundant optical backbone network that has two independent routing domains for Operational IP traffic. There is uncertainty as to whether these levels of control and independence will be available throughout the FTI-2 operational life cycle if shared network environments become the de facto standard.

The FAA's diverse mix of service requirements presents another challenge in the planning for the FTI-2 program. There are approximately 80 different "Layer 3" service classes that the FTI network must be capable of supporting. The service classes are defined in terms of reliability, maintainability, and availability levels, latency level, basic security level, physical interface, and

other parameters. The FAA is exploring options to reduce the number of unique interfaces to simplify the FTI-2 transition and gain economies of scale.

Along with the diverse mix of "Layer 3" service classes, the enterprise messaging services and value-added infrastructure services (as described above) also present challenges from a transition standpoint and their potential to affect the field of viable service providers because traditional Layer 3 transport service providers may not support them as standard service offerings. These challenges will likely the influence the FAA's acquisition strategy and the need to ensure a competitive environment.

Others aspects of the FAA operating environment that exceed commercial norms are the requirements for visibility into the physical configuration of services and the assurance that the FAA's service diversity and avoidance requirements are being met. While the FAA does not require visibility to the component level within the long-haul transport network, the FAA requires the assurance that on-site customer premise equipment strings and access paths to the transport network's points of presence have no common points of failure when path diversity and/or avoidance are required. The challenge for FTI-2 is whether this level of visibility and control will continue to be available as commercial services potentially migrate to network virtualization technologies.

The FAA's dependence on services based on time division multiplexing (TDM) technology presents another challenge. Some commercial telecommunications carriers have announced their intent to phase-out TDM-based services by as early as 2020. Currently, the majority (~90%) of the FAA's systems supporting air traffic control operations require TDM-based services to support their required system-to-system interfaces. While that percentage is expected to drop over the next 5-10 years, the FAA does not control where the TDM-based services will be phased-out first or the pace at which it will occur. This complicates the FAA's decision-making process when it comes to the potential need to invest in TDM-to-IP conversion devices to continue to support the communications interfaces of the FAA's legacy systems.

With the phase-out of TDM-based services, there is also the possibility that commercial telecommunications carriers may discontinue wireline infrastructure in remote locations. This presents a challenge for the FAA in that current generation wireless services have not proven capable of meeting the FAA's requirements for service availability, latency, and timing. In addition, the information security implications of commercial wireless service have yet to be determined.

<u>FAA Focus Areas for FTI-2 Planning:</u>

As the FAA progresses with its planning for the FTI-2 acquisition, there are specific focus areas that are fundamental to converging on an acquisition strategy that aligns with the FAA's programmatic objectives for FTI-2. These include, but are not necessarily limited to:

- As described above, the current FTI service provider has implemented an optical backbone for long-haul transport to support the FAA's long-range needs for bandwidth and to provide the visibility and control necessary to meet the availability, survivability, and restoration time requirements of the NAS. The FAA is interested in gaining a better understanding of

emerging technologies such as Software-Defined Networking and the ability to replicate private network attributes in a virtual (i.e. shared) environment.

- If the FAA is able to reduce the mix of service classes it requires, particularly in the case of unique physical interfaces, would that have the potential to provide economies of scale and, if so, at what point (in terms of the percentage of the service mix) would cost savings begin to be realized?
- The pricing model under the existing FTI contract is site-specific and every time a new site is established, new site-specific pricing has to be negotiated for the access bandwidth. If the FAA is able to transform its service requirements to predominantly "IP bandwidth as a commodity," would that facilitate the possible transformation to a "postalized" pricing construct that is not site-specific?
- To what extent do the FAA's requirements for enterprise messaging services and value-added infrastructure services affect the competitive "playing field?" Would the FAA benefit from additional competition if these requirements were split off for a contract award separate from the traditional transport services (Layers 1-3)?
- What are the implications of the phase-out of TDM-based services on the FAA's transition from FTI to FTI-2? Are there steps that can be taken to avoid "stranded investment" in TDM-to-IP conversion devices while the FTI network is still in operation?
- What affordable options does the FAA have if wireline infrastructure is decommissioned by commercial carriers and commercial wireless-based services do not meet the FAA's requirements?

These are some of the questions that the FAA hopes to answer through its market analysis and by working closely with industry stakeholders.